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A Model for Estimating the Risk of Profit Loss in Industrial Enterprises

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E.L. Pankratov[1]

Abstract:

Purpose: *In this paper we introduced a model for prognosis of profit of industrial enterprises. This model gives a possibility to make a prognosis of profit of these enterprises with account increasing of quantity of manufactured products, as well as various expenses of enterprises (raw material purchase costs, transportation costs, ...).*
Design/Methodology/Approach: *An analytical approach for analyzing of the influence of changing of various parameters on the profit of industrial enterprises has been introduced.*
Findings: *The model gives a possibility to decrease risk of decreasing of profit due to decreasing of overhead expenses.*
Practical Implications: *The model gives a possibility to make the prognosis of profit with account changing of quantity of manufactured products, as well as various expenses (raw materials, transportation costs, ...).*
Originality/Value: *In this paper we introduce a model for prognosis of profit of industrial enterprises with account of changing the volume of manufacturing production.*

Keywords: *Prognosis of profit of industrial enterprises, minimization of risk of decreasing of profit, industrial enterprises.*

JEL Classification: *O1, O3.*

Paper type: *Research article.*

[1]*Nizhny Novgorod State University, Nizhny Novgorod, Russia*
Nizhny Novgorod State Agrotechnical University, Nizhny Novgorod, Russia
elp2004@mail.ru;

1. Introduction

One of the main factors for optimization of functioning of industrial enterprises is increasing of profit, as well as a decreasing of risks of decreasing of the profit due to increasing of overhead expenses [1-4].

In this situation it is attracted an interest development of approaches of effective development of enterprises to decrease of overhead expenses [5-8]. In this paper we introduce a model for prognosis of profit of industrial enterprises with account of changing the volume of manufacturing production.

The model gives a possibility to decrease risk of decreasing of profit due to decreasing of overhead expenses. We also introduce an analytical approach for analysis of dependence of profit on different parameters.

2. Method of Solution and Results of Analysis

In this paper as the model of the considered profit we used the following relation

$$Q = V \cdot P - V \cdot U - V \cdot T - V \cdot S - V \cdot H. \quad (1)$$

Here V is the quantity of manufactured product; P is the price of a unit of the product; U is the price of raw materials, consumed per unit of production; T is the transportation costs per unit of product; S is the salary paid to employees per unit of production; H is the price of storage of a unit of products. The first term in the right side of the relation (1) is the revenue of the considered industrial enterprises. Other terms of the above relation describe different risks of losing of the revenue R (V).

The common revenue could be written as:

$$Q = V \cdot P - R(V). \quad (1a)$$

Price of products could be changed depending on its quantity. In this paper, we consider the simplest (linear) model of such a dependence $P(V) = A - B \cdot V$, where A and B are the parameters of the approximating function, taking into account the actual price change [9,10]. The analogous approximation could be used to describe salary of employees: $S(V) = C - D \cdot V$, where C and D are also the parameters approximation function. The relation (1) with account could be written as:

$$Q = V \cdot (A - B \cdot V) - V \cdot U - V \cdot T - V \cdot (C - D \cdot V) - V \cdot H. \quad (1b)$$

Profit Q depends on parameters U, T, S, H, A, B, C, D monotonically. The dependence of profit Q on the quantity of product V is non-monotonic. Extreme value of the profit could be defined in the framework of standard procedure, i.e., from the condition of equality to zero of the corresponding partial derivative: $\partial Q/\partial V = 0$ [11]. With account relation (1*a*) equation $\partial Q/\partial V = 0$ could be written as:

$$\partial Q/\partial V = A - 2B \cdot V - U - T - C + 2DV - H = 0. \quad (2)$$

One can obtain extreme value of quantity of manufactured product V_{extr} from the relation (2) in the following form:

$$V_{extr} = (A - U - T - C - H)/2(B - D). \quad (3)$$

Analogous way could be used to calculate extreme value of risk, i.e. by using condition of equality to zero of the corresponding partial derivative: $\partial R/\partial V = 0$ [11]

$$\partial R/\partial V = 2DV - U - T - C - H = 0. \quad (2a)$$

The relation (2*a*) gives a possibility to obtain relation for extreme value of risk V_{extr-r} in the following form

$$V_{extr-r} = (U + T + C + H)/2D. \quad (3a)$$

Dependencies of profit of industrial enterprises and risk of losing of the profit, as well as dependences of appropriate extreme values of manufactured product are shown in the figures below.

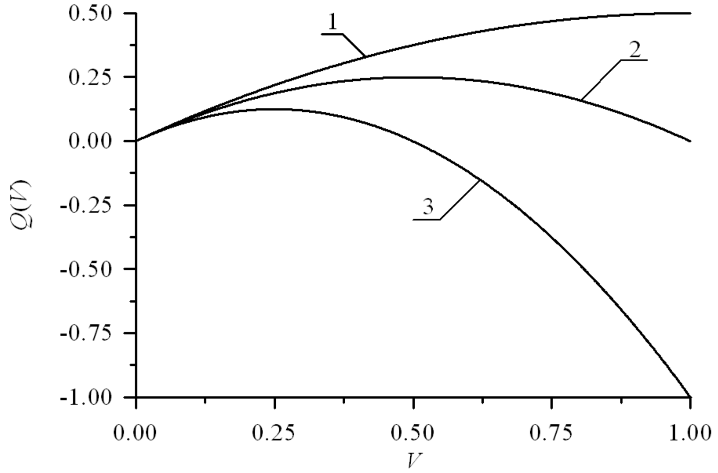
Figure 1 shows typical dependences of the volume of profit *Q* on the volume of manufactured product *V* for different values of parameters *A* and *B*. Increasing of number of curves corresponds to increasing of value of parameter *A* (Figure 1*a*) and *B* (Figure 1*b*).

Dependences of the volume of profit on values of parameters *U*, *T*, *S* are similar to those shown in Figure 1*a*. The considered figures show, that dependences of the value of profit on the value of manufactured product at different values of parameters could be monotonous and nonmonotonous with a pronounced extreme value (in our case it will be maximal value), which could be determined by the relation (3).

Figure 2 present dependences of value of profit on parameters *U*, *T*, *S*, *A* and *B*. All dependences are straight lines with different angular coefficients. Depending on the values of parameters the profit could be positive and negative.

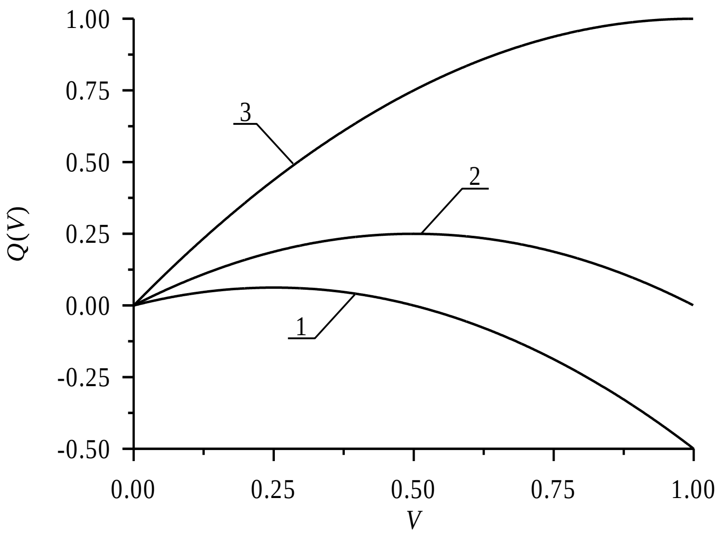
Negative value of profit corresponds to loss of the considered enterprise. Dependences of the risk of losing of profit on parameters are qualitatively similar with dependences on Figures 1 and 2.

Figure 1a. *Dependence of profit Q on the volume of products V for different values of parameters U, T, S, A (all dependencies are qualitatively similar to each other). An increase in the number of curves corresponds to increasing of the value of parameter B.*



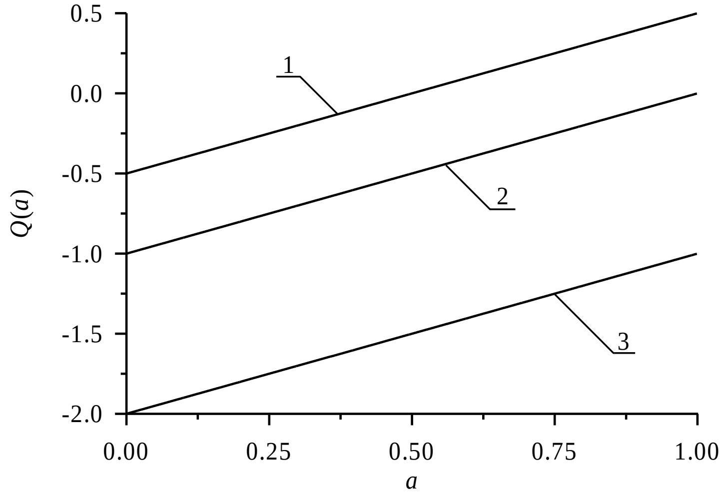
Source: *Own study.*

Figure 1b. *Dependence of profit Q on the volume of products V for different values of parameters U, T, S, B (all dependencies are qualitatively similar to each other). An increase in the number of curves corresponds to increasing of the value of parameter A.*



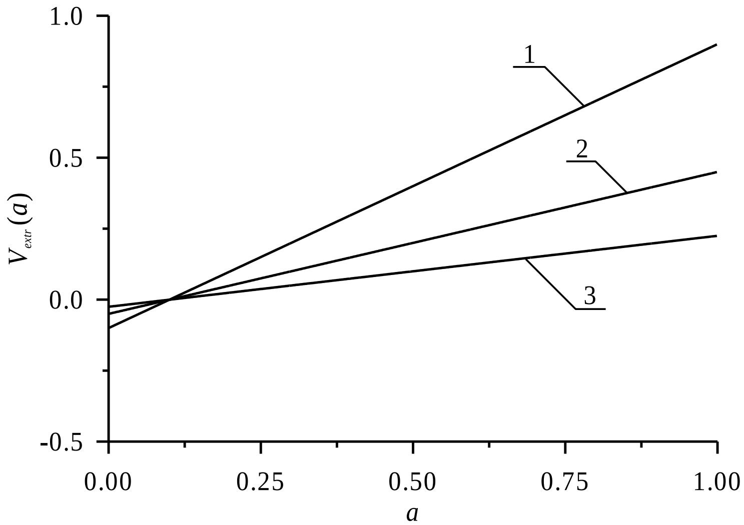
Source: *Own study.*

Figure 2a. *Dependence of profit Q on the volume of products A for different values of parameters U, T, S, B (all dependencies are qualitatively similar to each other). An increase in the number of curves corresponds to increasing of the value of parameter V.*



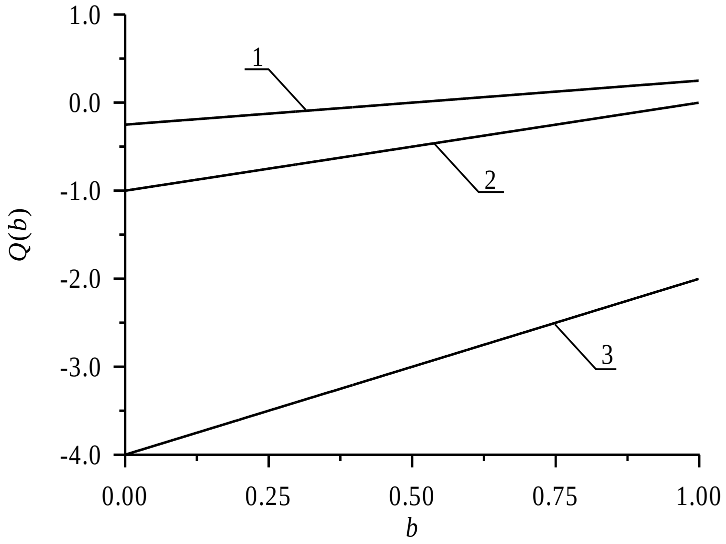
Source: *Own study.*

Figure 2b. *Dependence of profit Q on the volume of products B for different values of parameters U, T, S, A (all dependencies are qualitatively similar to each other). An increase in the number of curves corresponds to increasing of the value of parameter V.*



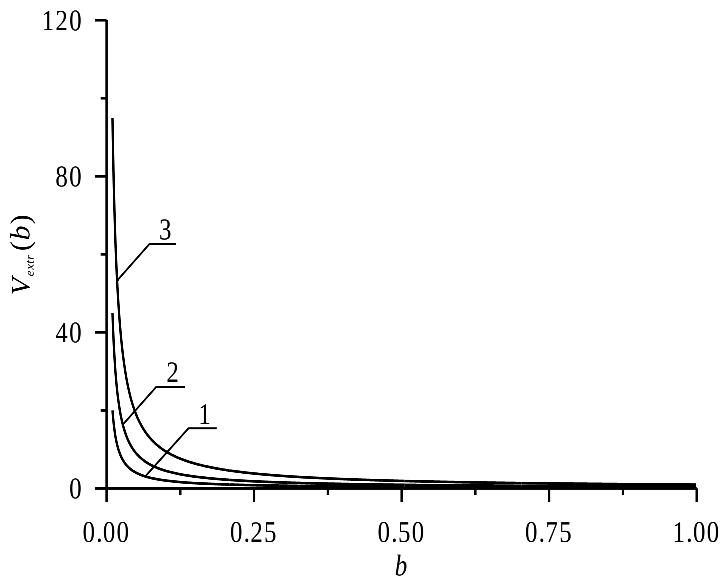
Source: *Own study.*

Figure 3a. *Dependencies of the maximum volume of manufactured products on the values of parameter A. Increasing of number of curves corresponds to increasing of value of parameter B.*



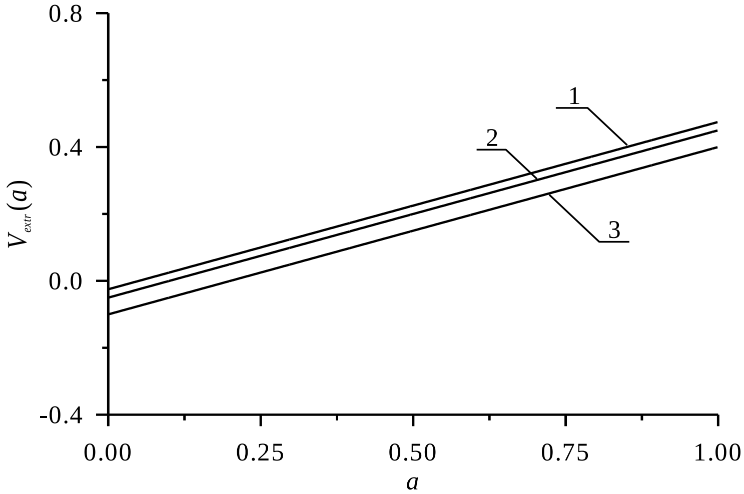
Source: *Own study.*

Figure 3b. *Dependencies of the maximum volume of products on the values of parameters A. Increasing of number of curves corresponds to increasing of values of the parameters A.*



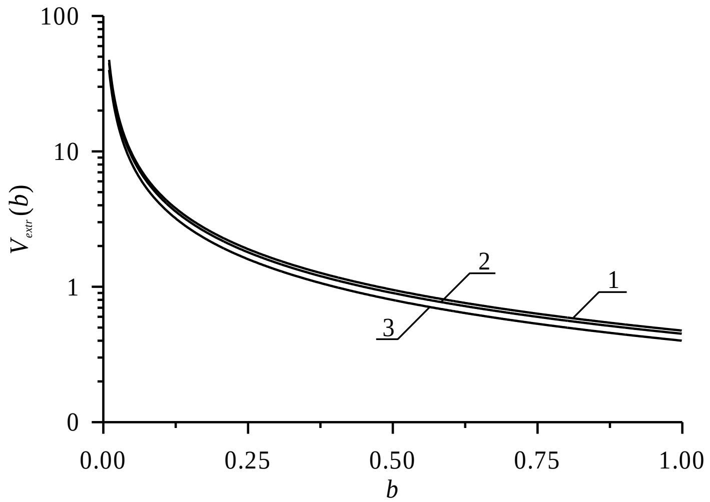
Source: *Own study.*

Figure 4a. *Dependencies of the maximal value of products on values of parameter B. Increasing of number of curves corresponds to increasing of value of parameter A.*



Source: *Own study.*

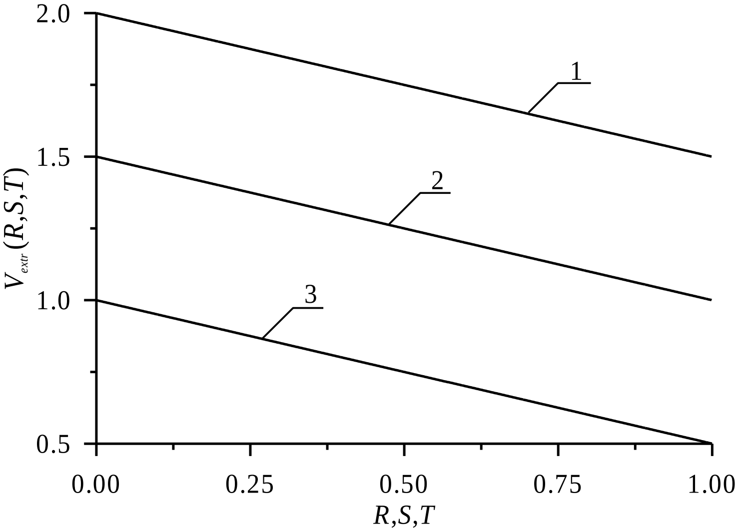
Figure 4b. *Dependencies of the maximal value of products on values of parameter A. Increasing of number of curves corresponds to increasing of value of parameter B.*



Source: *Own study.*

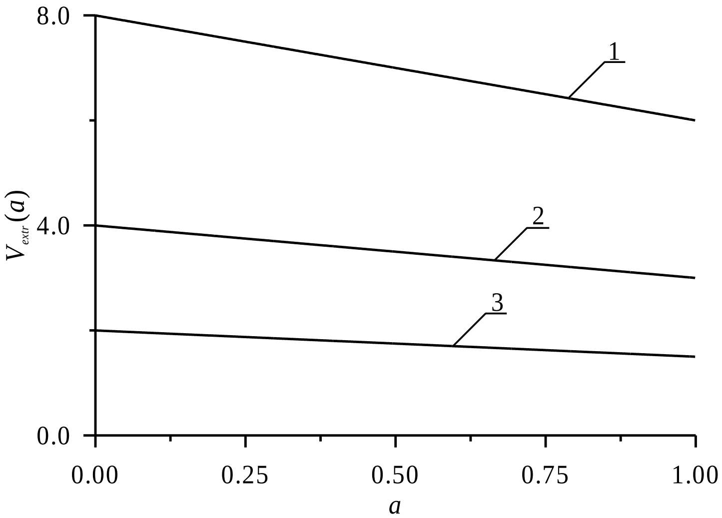
Figures 3-5 show dependences of the maximum value of the manufactured products (3) on several parameters for different values of other parameters. Many considered dependences linear. Some of these dependences are hyperbolic.

Figue 5a. *Dependences of the maximal value of product on values of the parameters U, T, S. Increasing of number of curves corresponds to increasing of value of parameter A*



Source: *Own study.*

Figure 5b. *Dependences of the maximal value of product on values of the parameters U, T, S. Increasing of number of curves corresponds to increasing of value of parameter B.*



Source: *Own study.*

3. Conclusion

In this paper we introduce a model for prognosis of profit of industrial enterprises with account of risk of losing of the profit. The model gives a possibility to make the prognosis of profit with account changing of quantity of manufactured products, as well as various expenses (raw materials, transportation costs, ...).

An analytical approach for analyzing the influence of various parameters on the considered profit has been introduced. Based on this approach we analyzed dependences of the considered profit, risk of losing of the profit on different parameters and optimal value of manufactured product.

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